

Amendment dated June 6, 2006

Reply to Office Action of March 6, 2006

### **AMENDMENTS TO THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (withdrawn) A method for forming at least one multilayered base having a predetermined pattern on at least one surface of a multi-surfaced LTCC module which has a stack of ceramic layers fired at a first, cofired temperature, comprising the steps of:

applying a plurality of metal layers in one or more predetermined patterns on one or more said surfaces;

firing said module, as predetermined said layers are applied, at a second temperature lower than said first, cofired temperature but of a value to partially sinter said metal layers; and

firing said module, after a last of said metal layers is applied, only once at an elevated temperature greater than said second temperature to fully sinter said metal layers.

2. (withdrawn) A method according to claim 1 which includes the step of:

firing said module with said metal layers at said second temperature of around 650° C.

3. (withdrawn) A method according to claim 1 which includes the step of:

firing said module with the last applied said metal layer at said elevated temperature in the range of around 800° C to 850° C.

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4. (withdrawn) A method for forming at least a first multilayered base having a first predetermined pattern on at least one surface of a multi-surfaced LTCC module which has a stack of ceramic layers fired at a first, cofired temperature, comprising the steps of:

applying to at least one said surface a first metal adhesion layer having said first predetermined pattern;

applying one or more intermediate metal layers on said first adhesion layer;

firing said module after each said applied intermediate layer at a second temperature lower than said first, cofired temperature but of a sufficient value to partially sinter said intermediate layers;

applying a first top metal layer to the last applied said intermediate layer; and

a) if no further bases are to be applied, firing said module at an elevated temperature greater than said second temperature to fully sinter all said metal layers; or

b) if further bases are to be applied, firing said module at said second temperature to partially sinter said first top metal layer;

said metal layers on said first surface forming a first base for receiving a first predetermined component.

5. (withdrawn) A method according to claim 4 which includes the steps of:

firing said module with said first top metal layer, at said second temperature; and forming a second said base on a second said surface by

applying to said second surface a second metal adhesion layer having a second predetermined pattern;

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applying one or more intermediate metal layers on said second adhesion layer;

firing said module after each said applied intermediate metal layer at a second temperature lower than said first, cofired temperature but of a sufficient value to partially sinter said intermediate metal layers of said second base;

applying a second top metal layer to the last applied said intermediate metal layer; and

a) if no further bases are to be applied, firing said module at an elevated temperature greater than said second temperature to fully sinter all said metal layers of said first and second bases; or

b) if further bases are to be applied, firing said module at said second temperature to partially sinter said second top metal layer;

said metal layers on said second surface forming a second base for receiving a second predetermined component.

6. (withdrawn) A method according to claim 5 which includes the steps of:

firing said module with said second top metal layer, at said second temperature; and forming a third said base on a third said surface by

applying to said third surface a third metal adhesion layer having a third predetermined pattern;

applying one or more intermediate metal layers on said third adhesion layer;

firing said module after each said applied intermediate metal layer at a second temperature lower than said first, cofired temperature but of a sufficient value to partially sinter said intermediate metal layers of said third base;

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applying a third top metal layer to the last applied said intermediate metal layer; and

a) if no further bases are to be applied, firing said module at an elevated temperature greater than said second temperature to fully sinter all said metal layers of said first, second and third bases; or

b) if further bases are to be applied, firing said module at said second temperature to partially sinter said third top metal layer;

said metal layers on said third surface forming a third base for receiving a third predetermined component.

7. (withdrawn) A method according to claims 4, 5 or 6 which includes the step of:

firing said module at a said second temperature of around 650° C.

8. (withdrawn) A method according to claims 4, 5 or 6 which includes the step of:

firing said module at a said elevated temperature in the range of around 800° C to 850° C.

9. (withdrawn) A method according to claims 4, 5 or 6 which includes the step of:

firing said module at a said elevated temperature equivalent to said first, cofired temperature.

10. (withdrawn) A method according to claims 4, 5 or 6 which includes the step of:

applying at least one said adhesion layer before said stack of ceramic layers are cofired.

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11. (withdrawn) A method according to claim 4 which includes the step of:

applying a frame member as said first component to said first base.

12. (withdrawn) A method according to claim 5 which includes the step of:

applying a heat sink member as said second component to said second base.

13. (withdrawn) A method according to claim 6 which includes the step of:

applying an electrical connector member as said third component to said third base.

14. (currently amended) A method ~~of for~~ forming at least a first multilayered base having a first predetermined pattern on ~~at least one surface~~ of a multi-surfaced LTCC module ~~comprised of which has~~ a stack of ceramic layers fired at a first, cofired temperature, comprising the steps of:

applying a first plurality of metal layers, including an adhesion layer, one or more intermediate layers and a top ~~first top metal layer, in said~~ a first predetermined pattern to build up a desired ~~the~~ thickness of said first multilayered base, and firing said module after application of predetermined ones of said plurality of metal layers at a second temperature lower than said first, cofired temperature, said second temperature having ~~but of~~ a value to partially sinter said plurality of metal layers of said first base; and which includes the steps of

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~~sequentially applying screening on at least one~~ said metal layers ~~to said one surface~~ and allowing ~~it each of said metal layers~~ to dry and then ~~firing each of said layers at said second temperature before applying a subsequent metal layer, prior to said firing;~~ and

a) if no further bases are to be ~~formed~~-applied, ~~again~~ firing said module ~~including said first base~~ at an elevated temperature greater than said second temperature ~~substantially equivalent to said first cofired temperature~~ to fully sinter all said metal layers ~~in said first base;~~ ~~or but~~

b) if ~~other further~~ bases ~~in addition to said first base~~ are to be ~~formed~~ applied, ~~only~~ firing said module at said second temperature to partially sinter ~~said metal layers in said first base~~ ~~first top metal layer;~~

~~said layers on said first surface forming a first base for receiving a first predetermined component on said one surface of said module.~~

15. (currently amended) A method according to claim 14 which includes the steps of:

firing ~~of said module including said first base with said first top metal layer,~~ at said second temperature; ~~and forming a second said base on a second said surface of said module, comprising the further step of: by~~

applying a second plurality of metal layers, including an adhesion layer, one or more intermediate layers, and a second top metal layer, in a second predetermined pattern to build up a desired ~~the~~ thickness of said second base, and firing said module after application of predetermined ones of said plurality of metal layers at said second ~~a second~~ temperature lower than said first; cofired temperature, but of a value to partially sinter said plurality of metal layers of said second base; and which includes the steps of:

~~sequentially applying screening on at least one~~ said metal layers ~~to said second surface thereby forming said second base, and allowing each of said~~

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metal layers it to dry and then applying a subsequent metal layer, ~~prior to said firing~~; and

a) if no further bases are to be ~~formed~~applied, ~~again~~ firing said module at said elevated temperature greater than said second temperature substantially equivalent to said first cofired temperature to fully sinter all said metal layers of said first and second said bases; or

b) if further bases are to be ~~formed~~applied, only firing said module at said second temperature to partially sinter said metal layers in said first and second bases~~second top metal layer~~;

~~said layers on said second surface forming a second base for receiving a second predetermined component~~ on said second surface of said module.

16. (currently amended) A method according to claim 15 which includes the steps of:

firing said module ~~with said second top metal layer~~ including said first and second base, at said second temperature; ~~and~~, forming a third said base on a third ~~said surface of said module~~, comprising the steps of: by

applying a third plurality of metal layers, including an adhesion layer, one or more intermediate layers and a third-top metal layer, in a third predetermined pattern to build up ~~the~~ a desired thickness of said third base, and firing said module after application of predetermined ones of said plurality of metal layers at a said second temperature lower than said first; cofired temperature, but of a value to partially sinter said plurality of metal layers of said third base; and which includes the steps of

sequentially applying~~screening on~~ at least one said metal layers to said third surface thereby forming said third base, ~~and~~ allowing it each of said metal layers to dry and then firing each said layer at said second temperature before applying a subsequent metal layer, ~~prior to said firing~~; and

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a) if no further bases are to be formed ~~applied~~, again firing said module at an elevated temperature greater than said second temperature substantially equivalent to said first cofired temperature to fully sinter all said metal layers of said first, second and third bases; or

b) if further bases are to be formed ~~applied~~, only firing said module at said second temperature to partially sinter said ~~third top metal layer~~ metal layers in said first, second, and third bases;

~~said layers on said third surface forming a third base for receiving a third predetermined component~~ on said third surface of said module.

17. (original) A method according to claims 14, 15 or 16 which includes the step of:

firing said module at a said second temperature of around 650° C.

18. (currently amended) A method according to claims 14, 15 or 16 wherein said first cofired temperature is in the range from ~~which includes the step of:~~

~~firing said module at a said elevated temperature in the range of around 800° C. to~~ around 850° C.

19. (cancelled)

20. (original) A method according to claim 14 which includes the step of: applying a frame member as said first component to said first base.

21. (original) A method according to claim 15 which includes the step of: applying a heat sink member as said second component to said second base.



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22. (original) A method according to claim 16 which includes the step of:  
applying an electrical connector member as said third  
component to said third base.

23. (new) A method of forming a plurality of multilayered  
bases each having a predetermined pattern on respective different  
surfaces of a multi-surfaced LTCC module comprised of a stack of  
ceramic layers fired at a first cofired temperature, comprising the  
steps of:

applying a plurality of metal layers, each including an adhesion layer,  
one or more intermediate layers and a top layer, in respective predetermined  
patterns to build up a desired thickness of said plurality of multilayered bases,  
and firing said module after application of predetermined ones of said plurality  
of metal layers of said plurality of bases at a second temperature lower than  
said first cofired temperature, said second temperature having a value to  
partially sinter said plurality of metal layers of said plurality of multilayered  
bases; and which further includes the steps of

sequentially applying said metal layers of each of said plurality of bases  
to said respective different surfaces of said module and allowing each of said  
metal layers to dry and firing each said layer at said second temperature before  
applying a subsequent metal layer; and

again firing said module including said plurality of bases at  
an elevated temperature greater than said second temperature to  
fully sinter all said metal layers in said plurality of bases;

applying a frame member as a first component to a first base  
of said plurality of bases;

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applying a heat sink member as a second component to a second base of said plurality of bases; and,

applying an electrical connector member as a third component to a third base of said plurality of bases.

24. (new) A method according to claim 23, wherein said first cofired temperature is in a range from around 800°C to around 850°C, said second temperature is around 650°C, and said elevated temperature is substantially equivalent to said first cofired temperature.